

Claims 1-6, 9-13, 16, and 19-21 have been rejected under 35 U.S.C. §103(a) as obvious over Hight (U.S. Patent No. 5,662,940) in view of Macchiarolo (U.S. Patent No. 4,297,224). According to the Examiner, Hight discloses a method for controlling microbial deposits by adding chlorinated hydantoins to an aqueous medium. The Examiner asserts that the method disclosed in Hight includes the disintegration of biofilms as claimed. The Examiner further contends that Hight uses BCDMH in Examples 1 and 2 and continues to assert that BCMH is a chlorinated hydantoin as set forth in claim 1. The Examiner characterizes Macchiarolo as teaching the utilization of chlorinated hydantoins to remove and disintegrate microorganism growth and biofilms from surfaces of water systems. The Examiner concludes that one skilled in the art would modify the teachings of Hight by disintegrating or removing biofilm or sludge as taught by Macchiarolo to prevent biofouling and contends that the specific amount of hydantoin added “would have been an obvious matter of process optimization...absent a sufficient showing of unexpected result” (page 3).

Claims 7, 8, 14, 15, 17, and 18 have been rejected under 35 U.S.C. §103(a) as obvious over Hight in view of Macchiarolo further in view of Sweeny (U.S. Patent No. 5,565,109). According to the Examiner, the teachings of Hight and Macchiarolo differ from the claims because the claims recite the in situ formation of chlorinated hydantoin, however the Examiner asserts that Sweeny discloses the same. The Examiner contends that it would have been obvious for one skilled in the art to modify the teachings of Hight and Macchiarolo with those of Sweeney to prevent biofouling.

Claim 22 has been rejected as obvious over Hight in view of Macchiarolo further in view of Perlich (U.S. Patent No. 6,773,611). According to the Examiner, the claims differ from Hight and Macchiarolo by reciting that the method of disintegrating biofilms can be performed in a ballast water system. However, the Examiner asserts that Perlich teaches that one skilled in the art would know to utilize a biocide to treat ballast water to control biofilms and concludes that it would have been obvious to modify the teachings of Hight and Macchiarolo to treat ballast water as disclosed in Perlich.

Response to Obviousness Rejections

Applicants have amended the claims to set forth that the method uses a monochlorodialkylhydantoin, dichlorodialkylhydantoin or a mixture thereof that can disintegrate a biofilm or sludge at a concentration in which disintegration is not observed using BCDMH under the same conditions.

The present claims are not obvious because none of the cited reference taken separately or in combination disclose or suggest the same. In support of Applicants' position, co-inventor, Dr. Philip Sweeny, submits herewith a Declaration pursuant to 37 C.F.R. §1.132 ("the Sweeny Declaration"). The present invention would not have been obvious to one of ordinary skill in the art as of the effective filing date in the U.S. because, as asserted by Dr. Sweeny, such an individual would not have expected that that a monochlorodialkylhydantoin, dichlorodialkylhydantoin or a mixture thereof can disintegrate biofouling at concentrations in which BCDMH is unable to disintegrate biofilms. See ¶¶ 7 and 11 of the Sweeny Declaration. Instead at this time as Dr. Sweeny explains, one of ordinary skill in the art would have expected the opposite: brominated hydantoins should outperform pure chlorinate ones. In particular, Dr. Sweeny has characterized both Hight and Macchiarolo as disclosing this opposite result. See ¶¶ 8 and 9 of the Sweeny Declaration. Furthermore, Dr. Sweeny comments that chlorinated hydantoins, in addition to being more efficacious than brominated hydantoins, are less expensive than brominated hydantoins to manufacture. See ¶ 10 of the Sweeny Declaration.

The prior art of Sweeny and Perlich also do not teach or suggest the surprising result that chlorinated hydantoins could outperform brominated hydantoins as recited in the claims. Instead, Sweeny teaches the general use of N-halohydantoins in a broad range of concentrations as biocides during pulp and paper manufacturing and Perlich discloses apparatuses for and methods of using a ballast water system for treating, monitoring, and controlling the concentration of biocide in ballast water. Perlich does not disclose the use of hydantoins. Neither Sweeny nor Perlich differentiate between brominated and chlorinated hydantoins.

To address specifically the Examiner's assertion that Hight describes both the control and disintegration of biofilms, Applicants offer a Declaration pursuant to 37 C.F.R. §1.132 by co-inventor, Dr. Michael Ludensky ("the Ludensky Declaration"). Dr. Ludensky opines that Hight does not describe or suggest the disintegration of biofilms, but merely discloses the control of biofilms. See ¶¶ 8 and 11 of the Ludensky Declaration. Dr. Ludensky presents scientific literature as evidence that the disintegration and control of biofilms were distinct concepts and that only some biocides can disintegrate existing biofilms. See ¶¶ 9 and 10 of the Ludensky Declaration. Thus, contrary to the Examiner's contentions that "control would appear to include disintegration or removing of at least some of the biofilm" (page 4 of the Office Action), some biocides, such as the ones described by Hight, only control but do not disintegrate biofilms.

Thus, since (1) none of the references taken alone or in combination describe or suggest that a monochlorodialkylhydantoin, dichlorodialkylhydantoin or a mixture thereof could disintegrate biofilms at concentrations in which BCDMH could not disintegrate biofilms as recited in the pending claims and (2) Hight does not describe or suggest the disintegration of biofilms, the invention is not obvious over these cited references. As such, Applicants respectfully request withdrawal of these obviousness rejections.

In view of the above amendments and remarks, it is respectfully requested that the application be reconsidered, all pending claims be allowed, and the case be passed to issue. If there are any other issues remaining which the Examiner believes could be resolved through a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

Respectfully submitted,

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